

567—73.19(455B) Hydrologic and hydraulic criteria.

73.19(1) *Hydrology and hydraulic calculations.* Hydrology and hydraulic calculations shall be submitted in the design report documenting the methods and analysis followed in modeling software selection, inflow design hydrograph determination, and reservoir routing. The hydrology and hydraulics section of the design report shall include design references, inflow hydrograph, reservoir stage storage, and stage discharge curves and clearly identify peak inflows, peak discharges, and reservoir elevations for the design floods.

73.19(2) *Design floods.* The specified freeboard design floods in the table below shall be passed without overtopping of the dam or the dam shall be designed to withstand such overflow. The specified spillway design flood in the table below shall be passed by the principal spillway without need for operation of an auxiliary spillway unless the auxiliary spillway is designed such that erosion is not expected during operation.

Hazard Potential	Freeboard Design Flood	Spillway Design Flood
Low Hazard	Q100	Q10
Significant Hazard	Q1000	Q50
High Hazard	Probable Maximum Flood	Q100

73.19(3) *Precipitation amounts.* The National Oceanic and Atmospheric Administration's NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 8, Version 2.0, dated 2013, shall be used for the Q10–Q1000 frequency storm events. NOAA Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates, United States, East of the 105th Meridian, dated 1978, shall be used for the probable maximum precipitation.

73.19(4) *Spatial and temporal rainfall distributions and storm durations.* The design report shall document the sources and methodologies for inflow hydrograph development. Distributions and durations that produce the highest impoundment water level shall be used for design.

73.19(5) *Spillway discharge capacity.* The spillway discharge capacity shall be sufficient to evacuate at least 80 percent of the volume of water temporarily stored during the principal spillway design flood within ten days. If this cannot be accomplished, the auxiliary spillway and freeboard design flood routings shall be made beginning with the impoundment level at the ten-day drawdown elevation.

73.19(6) *Incremental consequence analysis.* An inflow design flood based on an incremental consequence analysis may be developed and submitted to the department for review as an alternative to the design floods stated in subrule 73.19(2). The design flood selected using incremental consequence analysis is the flood above which there is a negligible increase in downstream water surface elevation, velocity, and consequences due to failure of the dam when compared to the same flood without failure. If the department concurs with the analysis, the freeboard design storm may be reduced. The minimum design flood for a high hazard dam shall be Q500. The minimum design flood for low hazard and significant hazard dams shall be Q100.

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